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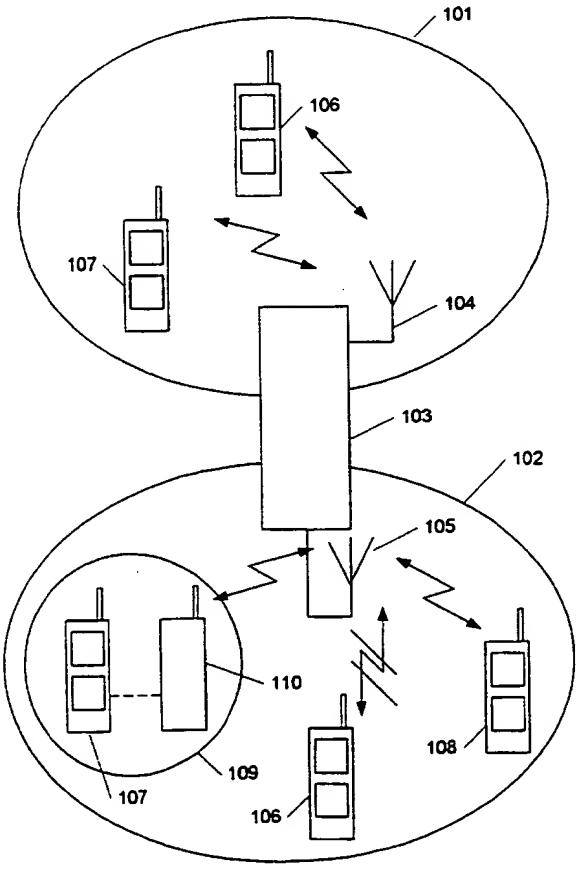
(54) Title: COMMUNICATIONS DEVICE



(57) Abstract: An access point (110; 210; 501) for connecting a mobile telephone (107; 201) to a telecommunications network (103), comprising first communications means (216) e.g. according to the Bluetooth standard for providing a wireless communications link to the mobile telephone (107; 201); and second communications means (213) for providing a communications link to the telecommunications network (103). The access point is characterized in that it is adapted to provide a wireless communications link e.g. according to the PDC or GSM standard to the telecommunications network (103).

WO 01/13660 A1

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Communications Device

This invention relates to an access point for connecting a mobile telephone to a telecommunications network, comprising first communications means for providing a wireless communications link to the mobile telephone; and second communications means for providing a communications link to the telecommunications network.

The official home page (www.bluetooth.com) of the so-called Bluetooth organisation discloses a stationary access point capable of connecting a cellular phone to a PSTN (Public Switched Telephone Network i.e. the voice telephone network available to anyone, world wide, with a telephone and access privileges) and LAN (Local Area Network) connection. Bluetooth is a unique standard that is supported by many manufacturers of consumer electronics. The standard is intended for relative short range communication between consumer electronics products.

However, such access points are large and capable of connecting a cellular phone to a wire line telephone network only. Further, the use of the cellular phone is limited to a predefined area in proximity of the access point.

Further, so-called multi-mode cellular phones adapted to switch between different types of telecommunications networks are well-known.

However, such multi-mode functionality is technical difficult to implement due to cost issues and performances such as battery lifetime and weight of the phone. Each of the multi-modes may have different specifications e.g. transmitting/receiving frequencies, protocols, etc. Moreover, a phone implementing all cellular telecommunica-

tions standards will be cumbersome and will rapidly be obsolete.

It is therefore an object of the present invention to provide a flexible communications device which allows a given small-sized mobile telephone to connect to any telecommunications standard anywhere.

This is achieved when the access point mentioned in the opening paragraph is characterized in that the access point is adapted to provide a wireless communications link to the telecommunications network.

Consequently, such an access point provides wireless communication with a telecommunications network by means of a mobile cellular phone despite the fact thatthe mobile cellular phone does not support the cellular phone system which is used in the area in which the cellular phone is used. The communication via the access point can be completely transparent to a user of a mobile telephone communicating via the access point. For instance, the access point can be placed in a bag while the user walks about.

When the access point is portable, it is especially expedient for use in conjunction with a mobile telephone or other portable devices.

In a preferred embodiment the physical dimensions of the access point are less than 13 cm x 5 cm x 3 cm. Such a size is suitable for bringing the access point along in e.g. a bag.

When the access point is battery powered, the access point is suitable for use on the move along with a mobile cellular phone.

The first communications means may be adapted to be operated according to the Bluetooth standard. Hereby, the ac-

cess point will be capable of communicating with most types of mobile cellular telephones or other consumer electronic products.

In a preferred embodiment the second communication means is adapted to be operated according to the PDC, PHS, GSM, PCS, D-AMPS, PDC/PHS, GSM/PDC or D-AMPS/PCS standard. Thereby at least one of the most widespread telecommunications standards is supported.

The communications device may further comprise communication means for providing wire line communication. Hereby, the flexibility of the communications device is enhanced, e.g. allowing cheaper communication expenses.

The first communications means may be connected to the second communications means for transmission of voice signals and/or data signals.

The first communications means is capable of providing wireless communication with other communications means over a relative long distance; the second communications means is capable of providing wireless communication with other communications means over a relative short distance. Hereby, battery power may be conserved.

The communications system may further comprise a mobile cellular telephone with a man-machine-interface and third communications means for providing communication with the second communications means.

The invention will be explained more fully below in connection with a preferred embodiment and with reference to the drawing, in which:

fig. 1 shows a telecommunications system comprising cellular mobile telephones;

fig. 2 shows a block diagram of a mobile cellular telephone and an access point according to the invention;

fig. 3 shows a state diagram for the operation of the access point;

fig. 4 shows a flowchart for a preferred control scheme for controlling which communications means to use; and

fig. 5 shows a physical embodiment of a portable access point according to the invention.

Fig. 1 shows a telecommunications system comprising cellular mobile telephones. The area 101 illustrates the coverage provided by a mobile telecommunications provider using a telecommunications standard e.g. the GSM standard. This standard is used in Europe. A user with access privileges and a GSM cellular telephone 106 can communicate with other users with access privileges and a GSM cellular telephone 107 via equipment 104 provided by the telecommunications provider.

The equipment 104 is connected to a telecommunications network 103 allowing communication with users using other telecommunications providers providing GSM cellular telephony, other types of cellular telephony, satellite telephony, wire line telephony (PSTN, Public Switched Telephone Network), etc.

Another area 102 illustrates the coverage provided by another mobile telecommunications provider using a different telecommunications standard e.g. the PDC standard. This standard is used in Japan. A user with access privileges and a PDC cellular telephone 108 can communicate with other users, as described above, via equipment 105 provided by the telecommunications provider and connected to the telecommunications network 103.

Thus, a user having a GSM cellular telephone can use this telephone in the area 101 and communicate with any other user who has a telephone and access privileges. Correspondingly, a user having a PDC cellular telephone can use this telephone in the area 102 and communicate with any other user. However, a user who lives in the area 101 e.g. Europe, and therefore has bought a GSM telephone 106 cannot use that telephone in the area 102 e.g. Japan because the GSM system is not used in that area.

According to the present invention there is provided an access point 110 adapted to provide access of e.g. the GSM telephone 107, intended for use in the area 101, to the telecommunications network 103. Thereby, the GSM telephone 107 can be used in the area 102 despite the fact that there is no GSM coverage in that area.

A system 109 comprising the telephone 107 and the access point 110 is adapted to communicate via a standard communications link e.g. a Bluetooth link. However, other communications systems can be used for the communication between the access point 110 and the mobile telephone 107.

Fig. 2 shows a block diagram of a mobile cellular telephone and an access point according to the invention. The mobile telephone 201 and the access point 210 correspond to the system 109. The mobile telephone 201 comprises communication means 207 with an antenna 206 to provide access to a telecommunications network. Further, the mobile telephone 201 comprises communication means 204 with an antenna 205 to provide communication via the access point 210.

A so-called Man Machine Interface (MMI) 202 includes a display, a keypad, a loudspeaker, a microphone, etc. - this is well-known to a person skilled in the art. The voice/data interface 209 is adapted to allow the mobile

telephone to receive voice commands and to exchange data with peripheral devices e.g. laptop computers, a headset, etc.

The control unit 203 is adapted to control the switch 208 in order to select which of the two communication means 205, 206 to use for communication of voice/data information. The control unit 203 is capable of determining which of the two communications means 205, 206 to use in response to a control scheme. When the GSM communication means 107 is selected, the switch 208 is in a 'GSM mode'. When the Bluetooth communications means 104 is selected the switch 208 is in a 'Bluetooth mode'. A preferred control scheme for controlling the switch 208 is described in the following.

The portable access point 210 comprises communications means 213 with an antenna 214 for providing access to a telecommunications network. Further, the portable access point 210 comprises communications means 216 with an antenna 215 for allowing the mobile telephone 201 to communicate via the access point 210.

The operation of the access point is controlled by the control unit 212 and is described in the following. The access point is battery powered by means of the battery 211.

Additionally, in a preferred embodiment the access point is also adapted to provide wire line communication.

Fig. 3 shows a state diagram for the operation of the access point. In order to control the operation of the access point three boolean variables are used: REQUEST, UPDATE, and TERMINATE. The variable 'REQUEST' is asserted via the Bluetooth communications means in response to a request from a mobile telephone requesting use of the ac-

cess point. The variable 'UPDATE' is likewise asserted by the Bluetooth communications means in response to a request from a mobile telephone requesting reception of status information of the access point form the access point. Such status information may comprise the level of battery charge, the level of signals received by the PDC communications means, etc. The variable 'TERMINATE' may be asserted by a mobile telephone terminating its use of the access point or by the elapse of a timer interval which starts when communication via the Bluetooth link terminates.

Initially, and as long as the variable REQUEST is not asserted, the access point is in a standby mode 301 in which battery power consumption is low. When the variable REQUEST is asserted, the PDC communication means will be switched on in the state 302 to enable PDC communication. Further, in state 303, the Bluetooth (BT) communications means are switched on to enable Bluetooth communication. In state 305 a mobile telephone is allowed to use the access point for telecommunication. When the variable UPDATE is asserted, the access point will transmit status information to the mobile telephone. Further, the mobile telephone may transmit status and/or identification information to the access point.

The access point is set in standby mode 301 when the variable TERMINATE is asserted.

Fig. 4 shows a flowchart for a preferred control scheme in a mobile telephone for selecting communications means. In step 401 the mobile telephone is switched on, and in step 402 the mobile is set in GSM mode (by means of the switch 108) as default. In step 403 it is verified whether GSM operation is possible e.g. by measuring the strength of a signal received by the GSM communications

means. If the switch 208 is not in 'GSM mode' this mode is selected. If GSM operation is possible (Yes), GSM operation is enabled in step 404 i.e. incoming and outgoing calls including voice, data, and text messages are processed. It is repeatedly verified whether GSM operation is possible, by repeatedly returning to step 403.

If GSM operation is not possible, i.e. the result of the verification in step 403 is No, it is verified in step 405 whether an access point is present. This includes setting the switch 208 in 'Bluetooth mode'. If no access point is present (No), step 403 is entered again. Alternatively, if an access point is present, a request of using the access point and asserting the variable REQUEST is transmitted in step 406. If this request is successful an update request is transmitted, asserting the variable UPDATE. The information received in response thereto is used to determine the operating conditions of the access point. The operating conditions of the access point may be presented to a user via the Man Machine Interface of the mobile telephone. In step 408 PDC communication via the access point is enabled, if the operating conditions of the access point satisfies a predefined criterion. Such a criterion may be that a predefined battery change level is present, that a predefined signal strength is present, etc.

Fig. 5 shows a physical embodiment of a portable access point according to the invention. This physical embodiment contains the communications circuit 110. The portable access point 501 comprises an antenna 502, a battery charge level indicator 503, and a signal strength indicator 504. The portable access point has a length L of about 13 cm, a width W of about 5 cm, and a height H of about 3 cm. This size is suitable for bringing the portable access point along in a pocket, in a bag, etc. How-

ever, a smaller size is possible and will further enhance the expediency of such a portable access point. The physical antenna 502 corresponds to the antenna 214 allowing for communication with a telecommunications network. The antenna 215 may be embodied as an antenna integrated on a printed circuit board (PCB) within the access point 501. Likewise, the antenna 214 may be embodied on a printed circuit board.

This invention is not limited to the above description of a preferred embodiment. For instance, the communications means 207 and 213 can be adapted to being operated according to the PDC, PHS, GSM, PCS, D-AMPS, PDC/PHS, GSM/PDC, D-AMPS/PCS standard, or any other standard.

CLAIMS

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1. An access point (110; 210; 501) for connecting a mobile telephone (107; 201) to a telecommunications network (103), comprising

first communications means (216) for providing a wireless communications link to the mobile telephone (107; 201); and

second communications means (213) for providing a communications link to the telecommunications network (103)

characterized in that

the access point (110; 210; 501) is adapted to provide a wireless communications link to the telecommunications network (103).

2. An access point (110; 210; 501) according to claim 1, characterized in that the access point is portable.

3. An access point (110; 210; 501) according to claims 1-2, characterized in that the physical dimensions of the access point are less than 13 cm x 5 cm x 3 cm.

4. An access point (110; 210; 501) according to claims 1-3, characterized in that the access point is battery powered.

5. An access point (110; 210; 501) according to claims 1-4, characterized in that the first communications means (216) is adapted to be operated according to the Bluetooth standard.

6. An access point (110; 210; 501) according to claims 1-5, characterized in that the second communications means (213) is adapted to be operated according to the PDC, PHS, GSM, PCS, D-AMPS, PDC/PHS, GSM/PDC or D-AMPS/PCS standard.

7. An access point (110; 210; 501) according to claims 1-6, characterized in that the communications device further comprises communications means (212) for providing wire line communication.

8. An access point (110; 210; 501) according to claims 1-7, characterized in that the first communications means (216) is connected to the second communications means (213) for transmission of voice signals and/or data signals.

9. An access point (110; 210; 501) according to claims 1-8, characterized in that the first communications means (216) is capable of providing wireless communication with other communication means over a relative short distance; and that the second communications means (213) is capable of providing wireless communication with other communications means over a relative long distance.

10. A communications system (109; 201, 210) according to claims 1-9, characterized in that the communications system further comprises a mobile cellular telephone (107; 201) with a man-machine-interface and third communications means (204) for providing communication with the first communications means.

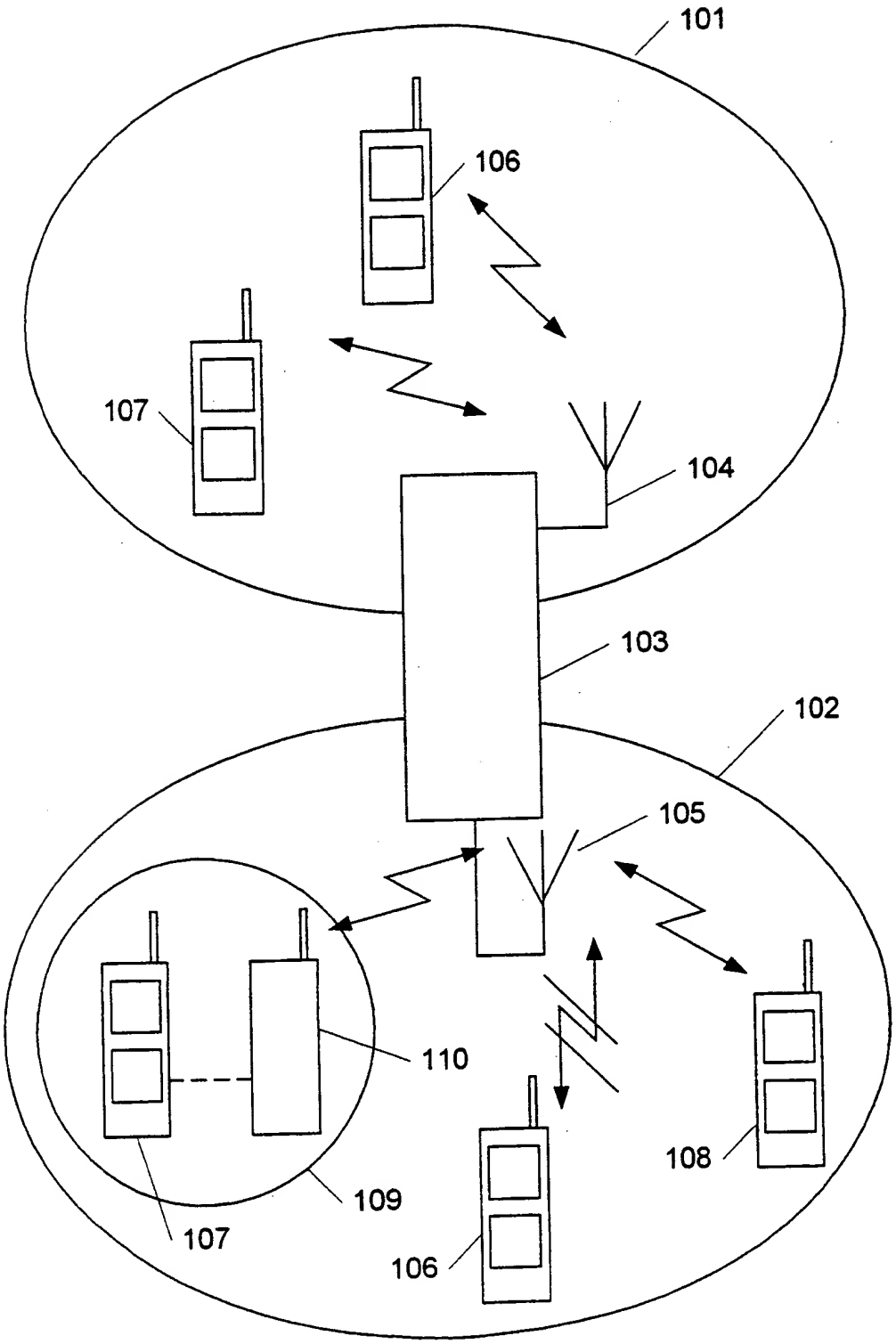
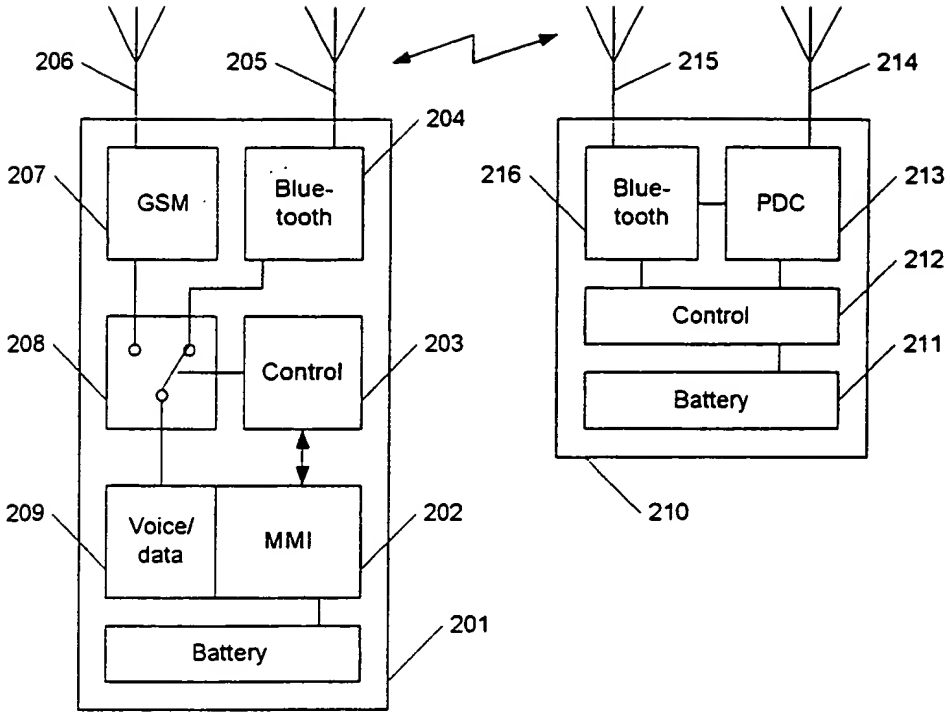


Fig. 1


206
205
215
214
204
207
GSM
Blue-
tooth
216
Blue-
tooth
PDC
213
212
208
Control
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211
Battery
209
Voice/
data
MMI
202
210
201
Battery

Fig. 2

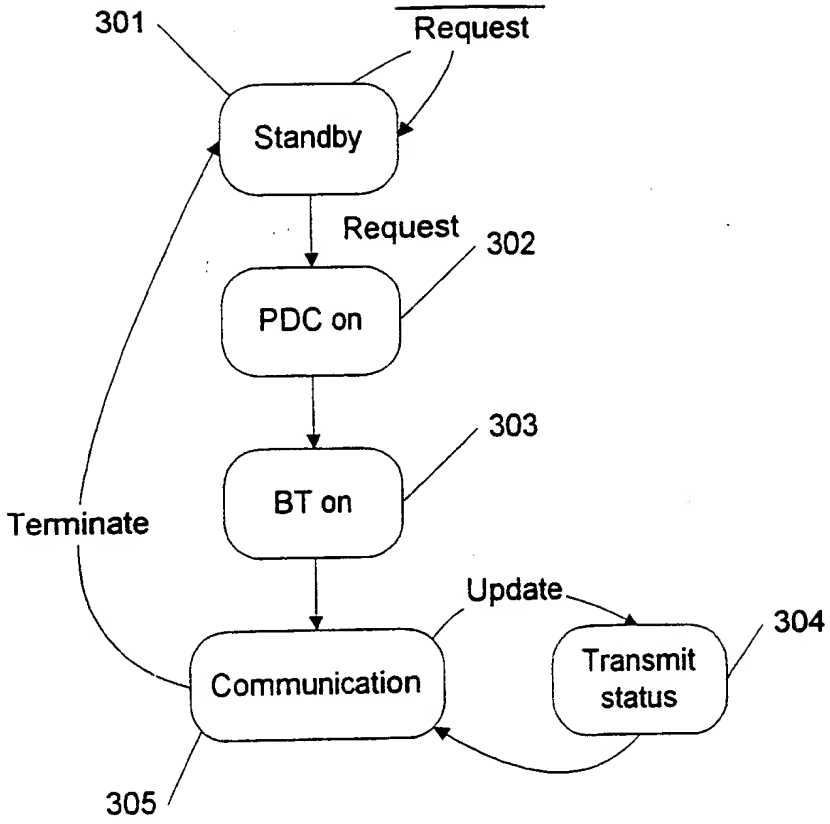
301
Request
Standby
Request
302
PDC on
303
BT on
Terminate
Update
304
Transmit status
Communication
305

Fig. 3

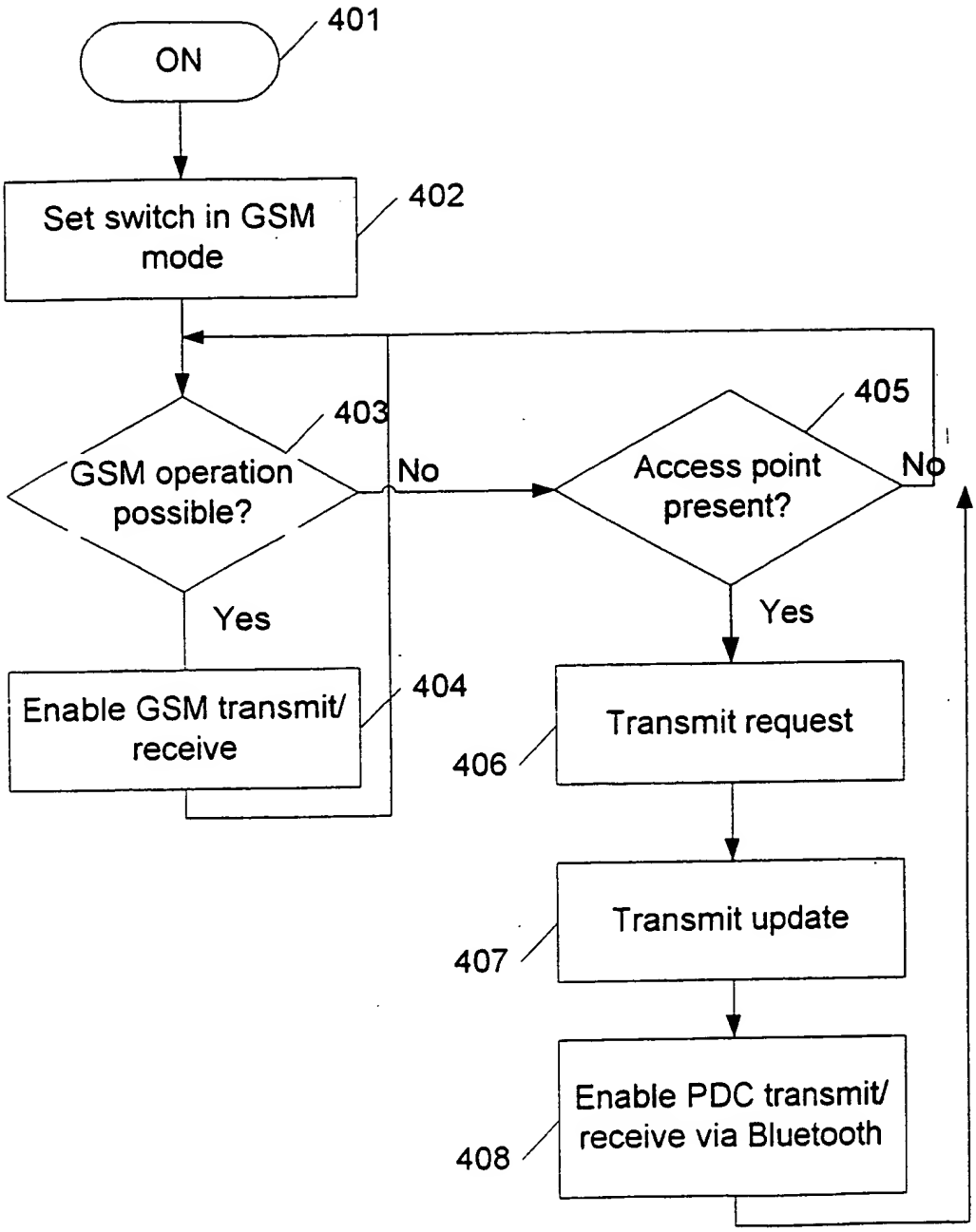

Fig. 4

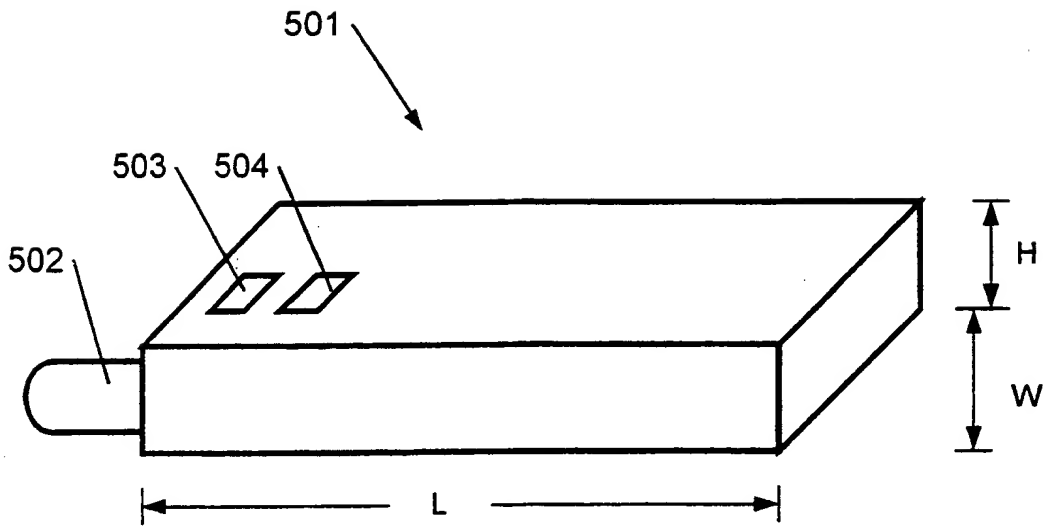

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01549

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/32
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9909771 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 25 February 1999 (25.02.99), page 3, line 12 - page 5, line 10	1-10
A	EP 0682458 A2 (NEC CORPORATION), 15 November 1995 (15.11.95), page 2, column 2, line 20 - page 3, column 1, line 37	1-10
A	EP 0521609 A2 (NOKIA MOBILE PHONES LTD.), 7 January 1993 (07.01.93), page 2, column 2, line 5 - page 3, column 1, line 24	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SE 00/01549

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